PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 7/173, 7/16

A1

(11) International Publication Number: **WO 99/57904**

(43) International Publication Date: 11 November 1999 (11.11.99)

(21) International Application Number: PCT/US99/09057

(22) International Filing Date: 27 April 1999 (27.04.99)

(30) Priority Data:
09/070,759 1 May 1998 (01.05.98) US

(71) Applicant: GENERAL INSTRUMENT CORPORATION [US/US]; 101 Tournament Drive, Horsham, PA 19044 (US).

(72) Inventor: MICHAUD, Ted, R.; 3 Pleasant Mill Court, Medford, NJ 08055 (US).

(74) Agent: NICHOLS, Steven, L.; Rader, Fishman & Grauer, Lion Building, 1233 20th Street, N.W., Washington, DC 20036 (US).

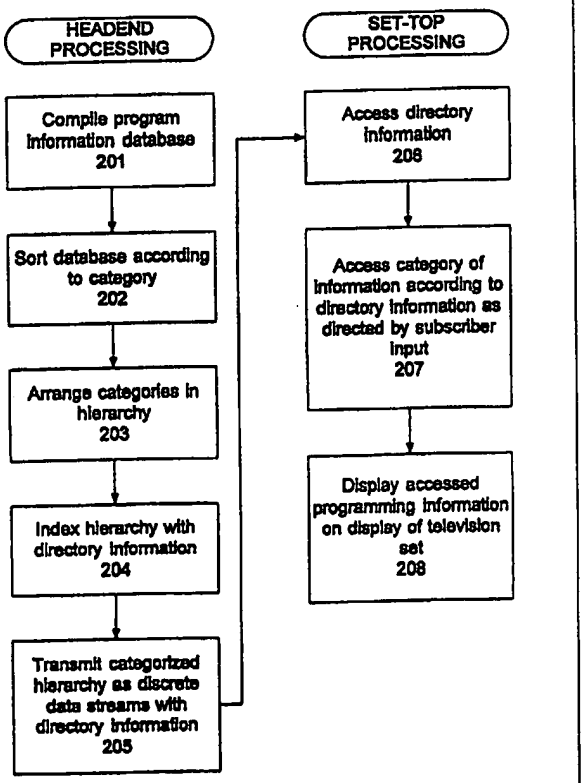
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: METHOD AND APPARATUS FOR PROVIDING AN INTERACTIVE PROGRAM GUIDE WITH HEADEND PROCESSING

(57) Abstract

A method and apparatus of providing an electronic guide to television programming provides a headend database and processor which segments and categorizes programming information which is then broadcast in a hierarchy over an out-of-band channel. Individual subscriber's set-top terminals access and display the guide information direct from the headend server in response to input from the subscriber. Alternatively, individual set-top terminals submit requests for particular guide information which are filled by the server serially over the out-of-band channel.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

TITLE OF THE INVENTION

Method and Apparatus for Providing an Interactive Program Guide with Headend Processing.

FIELD OF THE INVENTION

The present invention relates to the field of distributing television programming information. More particularly, the present invention relates to a method and apparatus for providing an interactive program guide in which program information is processed centrally by a service provider and is downloaded directly to viewer's screens thereby eliminating the need for extensive and expensive memory at the viewer's location.

BACKGROUND OF THE INVENTION

Due to the phenomenal popularity of television in modern culture, the number of television stations in a metropolitan area and the number of channels a cable network and satellite system support increases regularly. The result is a large and growing number of programs which are of potential interest to a particular viewer. To inform viewers of available programming a number of devices have been developed.

Traditionally, published program guides provided in magazines or by local newspapers have been a standard means of ascertaining available programming. However, as the amount of programming available increases, newspapers become more selective of the listings provided. Other published guides may attempt to list all available

programming. However, the guide becomes so lengthy that it is no longer useful for the viewer who wishes to quickly determine what programming is available or wishes to find all the listings for a particular type of programming. Moreover, published program listings cannot be updated to reflect last minute schedule changes and additions.

To overcome the problems inherent in published program listings, electronic program guides have been developed. These systems involve storing an electronic program guide in electronic memory within the viewer's television or within a set-top terminal connected to the viewer's television. The user can then access the program guide for display on the television screen.

For example, U.S. Pat. Nos. 4,288,809 to Yabe and 4,052,719 to Hutt et al. (both incorporated herein by reference) describe such a system in which alphanumeric program information is transmitted during the blank field intervals of the incoming video signals. The information is identified by an identification code and is stored in a memory associated with a viewer's television where it can be recalled for display on the television screen. The memory is a random access memory (RAM), and the programming information is continuously updated through the transmission of new information in the blank field intervals of the incoming signal.

Similarly, U.S. Pat. No. 4,203,130 to Doumit et al. (incorporated herein by reference) describes the display of program schedule information and other data to cable

subscribers. The programming information is included in the television signal transmitted over the cable and is stored in memory associated with the viewer's television where it can be retrieved and displayed. The display utilizes the entire television screen.

U.S. Patent No. 4,751,578 to Reiter et al. (incorporated herein by reference) discloses a similar system for providing programming information. However, the display taught by Reiter et al. can utilize the entire screen or can be an overlay on, or window in, the televised programming being received. Programming information is stored in a local RAM and is updated by information encoded in the television signal, provided over a telephone link, or recorded on magnetic cards or floppy disks.

A similar electronic programming guide is also taught in U.S. Patent No. 4,706,121 to Young (incorporated herein by reference). The Young system stores electronic programming information in a memory at the viewer's location, and can be used to program a connected VCR to record the listed programs without the viewer transferring and re-entering the program information to the VCR.

A problem with all these prior systems is the use of memory at the viewer's location to store the electronic program guide. As the number of available channels and programs proliferates, more and more memory must be provided to store the associated electronic program

guide. This increases the expense and bulk of electronic program equipment obtained by the viewer.

Accordingly, there is a need in the art for a method and system of providing electronic television programming information which can be continuously updated, searched and organized upon request from the viewer, and which is not limited by the a viewer's memory unit and processing hardware.

SUMMARY OF THE INVENTION

It is an object of the present invention to meet the above-described needs and others. Specifically, it is an object of the present invention to provide a method and system of providing electronic television programming information which can be continuously updated, searched and organized upon request from the viewer, and which is not limited by the a viewer's memory unit and processing hardware.

Additional objects, advantages and novel features of the invention will be set forth in the description which follows or may be learned by those skilled in the art through reading these materials or practicing the invention. The objects and advantages of the invention may be achieved through the means recited in the attached claims.

To achieve these various objects, the present invention may be embodied and described as a system for disseminating electronic program guide information which includes an electronic program information database

maintained by a network service provider; and a headend processor which accesses the database, sorts and compiles information from the database, and transmits the information to a set-top terminal which displays the information on a television.

In this way, there is no need for each set-top terminal to download and store a copy of the database for local use. Therefore, preferably, the set-top terminal does not store in memory all the information from the database.

In one embodiment, the set-top terminal comprises a transmitter for transmitting a request to the headend processor for information from the database which meets pre-determined criteria. The headend processor receives the request, compiles a response to the request from the information in the database, and broadcasts the response to the set-top terminal with a designation of set-top terminal which made the request.

This designation distinguishes the set-top terminal which made the request from other set-top terminals to which the response is also broadcast. The set-top terminal which originated the request can then identify the response and display the program guide information meeting the request criteria, e.g. sporting events for the next three hours.

Alternatively, the headend processor may sort the information in the database according to categories and arrange the categories in a hierarchy. The headend processor then transmits the hierarchy of categorically

sorted information as data streams in an out-of-band channel to set-top terminals. The data streams include a directory signal which provides the set-top terminals with a directory of the hierarchy of categorically sorted information. The set-top terminals then extract information from the data streams using the directory signal in response to user inputs indicating desired information.

The present invention also encompasses a method for disseminating electronic program guide information by transmitting program information to set-top terminals of subscribers for direct display on a television set, with the transmitting being performed by a headend processor which has sorted and compiled the information from an electronic program information database maintained by a network service provider.

The method of the present invention may also include transmitting, with one of the set-top terminals, a request to the headend processor for information from the database which meets pre-determined criteria. Preferably, the transmission includes in the request a designation of the set-top terminal making the request.

In response, the following steps are executed by the headend processor: receiving the request; compiling a response to the request consisting of information from the database matching the predetermined criteria; and broadcasting the response to the set-top terminals with a designation of the set-top terminal which made the request.

The set-top terminal making the request then executes the following steps: identifying the response by recognizing the designation; extracting said response; and displaying said response on a television screen.

Alternatively, the method of the present invention may provide programming information by sorting, with the headend processor, the information in the database according to category and arranging the categories in a hierarchy; transmitting the hierarchy of categorically sorted information as data streams in an out-of-band channel; and providing with the data streams a directory signal which provides the set-top terminals with a directory of the hierarchy of categorically sorted information. In this embodiment, the set-top terminals then execute the steps of extracting information from the data streams using the directory signal in response to user inputs indicating desired information.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the present invention and are a part of the specification. Together with the following description, the drawings demonstrate and explain the principles of the present invention.

Fig. 1 is a diagram of a system according to the present invention.

Fig. 2 is a flowchart showing the processing steps of a first embodiment of the present invention.

Fig. 3 is a flowchart showing the processing steps of a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described with reference to the drawings.

As shown in Fig. 1, the basic components of a system according to the present invention are a television set 102 which is connected to a set-top terminal 101. As will be appreciated, the functions of the set-top terminal could be incorporated into the television set 102 during manufacture without effect on the principles of the present invention.

The set-top terminal 101 in the illustrated example is connected via a cable network to a cable television service provider. Specifically, the set-top terminal 101 is connected to a central headend processor 103 maintained by the service provider. The processor 103 has access to a program information database 104 which is constantly updated with the latest television programming information.

As will be understood, all the many subscribers to the network of the service provider will have individual television sets and set-top terminals. All of which will be connected to the headend processor 103. While illustrated using a cable television network, it will be appreciated that the present invention could also be practiced with a satellite or conventional broadcast television network.

The present invention takes advantage of the higher band-width television networks, particularly cable

networks, to provide an interactive electronic program guide in a broadcast television environment. According to the principles of the present invention, the electronic database of program information 104 is stored at a headend facility, i.e. the service provider or cable television company, and is not stored locally at each subscriber's television set 102.

The information in the headend database 104 is processed by the headend processor 103 and is compiled and transmitted over the television network to subscriber's television sets 102 for display. Accordingly, there is no need for the entire database 104 to be transmitted and stored locally at each subscriber's set-top terminal 101.

The headend processor 103 may provide program information in various formats and on various bases. For example, the processor 103 may provide the programming information on a broadcast carousel that continuously runs through the listing of available programs with the user being able to interactively switch to any of the listed programs by indicating a selection on the programming guide.

Accordingly, a set-top terminal 101 or television component receiving the information need have only minimal processing and memory capabilities. Moreover, a central server acts as the headend processor 103 making it easier to update or correct the program information database 104. Therefore, the integrity of the database is enhanced.

Alternatively, as illustrated in Fig. 2, under the principles of the present invention, the headend processor may provide a hierarchy of data streams each matching a particular category of programming information which can be accessed by subscribers.

First, the program information database is compiled 201. Then the database is sorted according to programming category 202. Categories of programming may include, for example, the next four hours of all programs available, all sporting events being televised on the current day, all adventure movies being shown this evening.

The program guide database 104 includes, for example, the program title, broadcast time and channel for each program available. The categorization or segmentation of the data is important in that it determines the minimum granularity of the database 104. The server operator creates the appropriate database segmentation rules to guide the server's operation. The operator will also support the sorting of the database by creating sort categories and hierarchies.

The headend processor 103 will then create separate lists of the programs available in each particular category during a specified time period 202. These categorical listings are then arranged into the sort hierarchy 203, e.g. adventure movies and romance movies fall under a single hierarchical category of "movies."

The network operator will then direct the server to partition the database components into various streams

for broadcast on the network. The subscribers using their personal equipment, e.g. a set-top terminal 101, can then access the stream of data containing the programming information desired by the subscriber directly from the headend server 103.

The headend processor 103 will also include a directory signal component that will support the set-top terminals 101 in accessing the database components in the hierarchy of broadcast data steams 204. Under the principles of the present invention, an out-of-band communication channel may be used to broadcast the directory information to all set-top terminals 205. The ability to include the short-term database files with the directory information in the broadcast stream provides a more flexible application environment. The server and network operator may also provide an access control system that allows access to various segments of the database to be sold to subscribers.

In this example, the set top terminal 101 includes the necessary hardware and software to receive the directory information detailing the database segmentation and hierarchy 206 and to use that directory information to navigate through the hierarchy of database segments in the data streams as directed by a subscriber 207. The set-top terminal 101 then displays the selected program information for the subscriber 208.

In another embodiment of the present invention illustrated in Fig. 3, the constant sorting of the program information into a hierarchy of categories to

broadcast is replaced by an interactive data request system. In this embodiment, the subscriber selects from a list of available sort criteria, i.e. program categories and time periods, for which guide information is desired 301. The set-top terminal 101 includes a transmitter which transmits the request to the server of the headend processor 103 over the television network 302.

The headend processor 103 then receives the request 303 and sorts and compiles the information requested by the subscriber 304, 305. The response to the request is provided with a code that will be recognized by the requesting subscriber's set-top terminal 101. The response is then broadcast over the out-of-band program guide information channel 306. Requests are fulfilled as received.

The requesting subscriber's set-top terminal 101 monitors the out-of-band information channel after transmitting the request for information 307 and identifies the response to its request from the data being transmitted over the out-of-band information channel 308. The set-top terminal 101 then retrieves the response for display to the subscriber. In this manner, subscribers can request individually desired searches which may be more varied and detailed than can be provided under the hierarchical system described above.

The preceding description has been presented only to illustrate and describe the invention. It is not intended to be exhaustive or to limit the invention to

any precise form disclosed. Many modifications and variations are possible in light of the above teaching.

The preferred embodiment was chosen and described in order to best explain the principles of the invention and its practical application. The preceding description is intended to enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims.

WHAT IS CLAIMED IS:

1. A system for disseminating electronic program guide information comprising:

an electronic program information database maintained by a network service provider; and

a headend processor which accesses said database, sorts and compiles information from said database, and transmits said information to a set-top terminal which displays said information on a television.

2. A system as claimed in claim 1, wherein said set-top terminal comprises a transmitter for transmitting a request to said headend processor for information from said database meeting pre-determined criteria.

3. A system as claimed in claim 2, wherein said headend processor receives said request, compiles a response to said request from said information in said database, and broadcasts said response to said set-top terminal with a designation of set-top terminal which made the request which distinguishes said set-top terminal from other set-top terminals to which said response is also broadcast.

4. A system as claimed in claim 1, wherein headend processor sorts said information in said database

according to categories and arranges said categories in a hierarchy.

5. A system as claimed in claim 4, wherein said headend processor transmits said hierarchy of categorically sorted information as data streams in an out-of-band channel to set-top terminals.

6. A system as claimed in claim 5, wherein said data streams include a directory signal which provides said set-top terminals with a directory of said hierarchy of categorically sorted information.

7. A system as claimed in claim 6, wherein said set-top terminals extract information from said data streams using said directory signal in response to user inputs indicating desired information.

8. A system as claimed in claim 1, wherein said set-top terminal does not store in memory all the information from said database.

9. A method for disseminating electronic program guide information transmitting program information to set-top terminals of subscribers for direct display on a television set, said transmitting being performed by a headend processor which has sorted and compiled said

information from an electronic program information database maintained by a network service provider.

10. A method as claimed in claim 9, further comprising transmitting with one of said set-top terminals a request to said headend processor for information from said database meeting pre-determined criteria.

11. A method as claimed in claim 10, further comprising including in said request a designation of said set-top terminal making said request.

12. A method as claimed in claim 10, further comprising:

receiving said request with said headend processor;

compiling a response to said request consisting of information from said database matching said predetermined criteria; and

broadcasting said response to said set-top terminals with a designation of the set-top terminal which made the request.

13. A method as claimed in claim 12, further comprising:

identifying said response with said set-top terminal which made the request by recognizing said designation;

extracting said response; and

displaying said response on a television screen.

14. A method as claimed in claim 9, further comprising sorting, with said headend processor, said information in said database according to category and arranging said categories in a hierarchy.

15. A method as claimed in claim 14, further comprising transmitting said hierarchy of categorically sorted information as data streams in an out-of-band channel.

16. A method as claimed in claim 15, further comprising providing with said data streams a directory signal which provides said set-top terminals with a directory of said hierarchy of categorically sorted information.

17. A method as claimed in claim 16, further comprising extracting with said set-top terminals information from said data streams using said directory signal in response to user inputs indicating desired information.

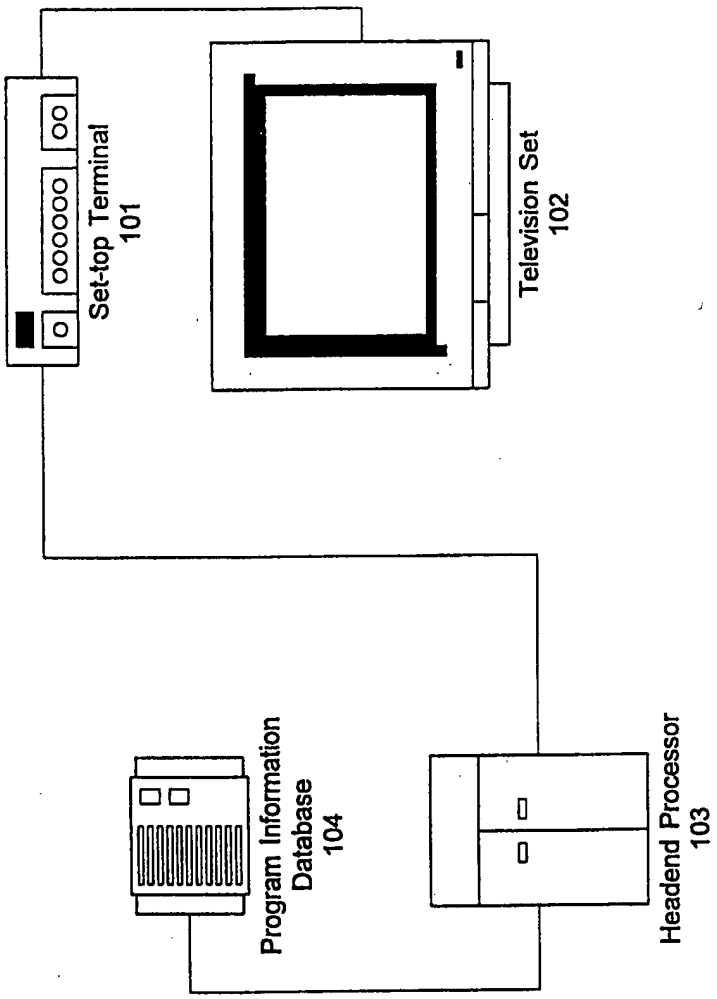

Set-top Terminal
101
Television Set
102
Program Information
Database
104
Headend Processor
103

Fig. 1

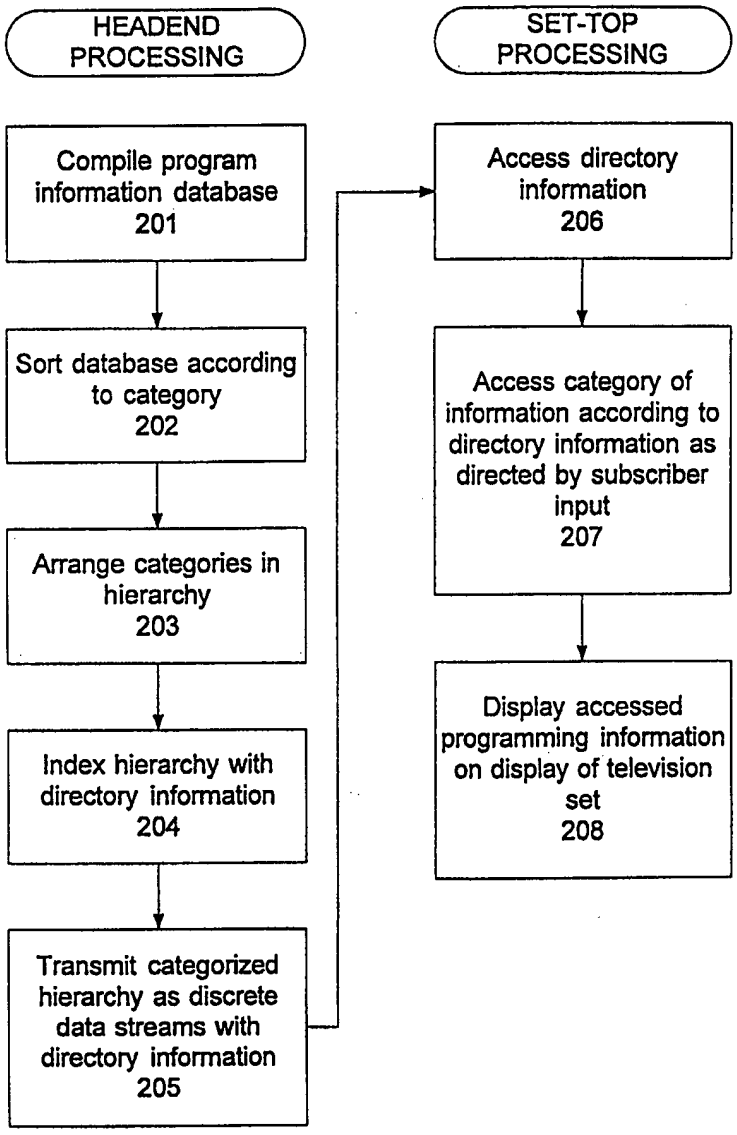

HEADEND PROCESSING
SET-TOP PROCESSING
Compile program information database 201
Sort database according to category 202
Arrange categories in hierarchy 203
Index hierarchy with directory information 204
Transmit categorized hierarchy as discrete data streams with directory information 205
Access directory information 206
Access category of information according to directory information as directed by subscriber input 207
Display accessed programming information on display of television set 208

Fig. 2

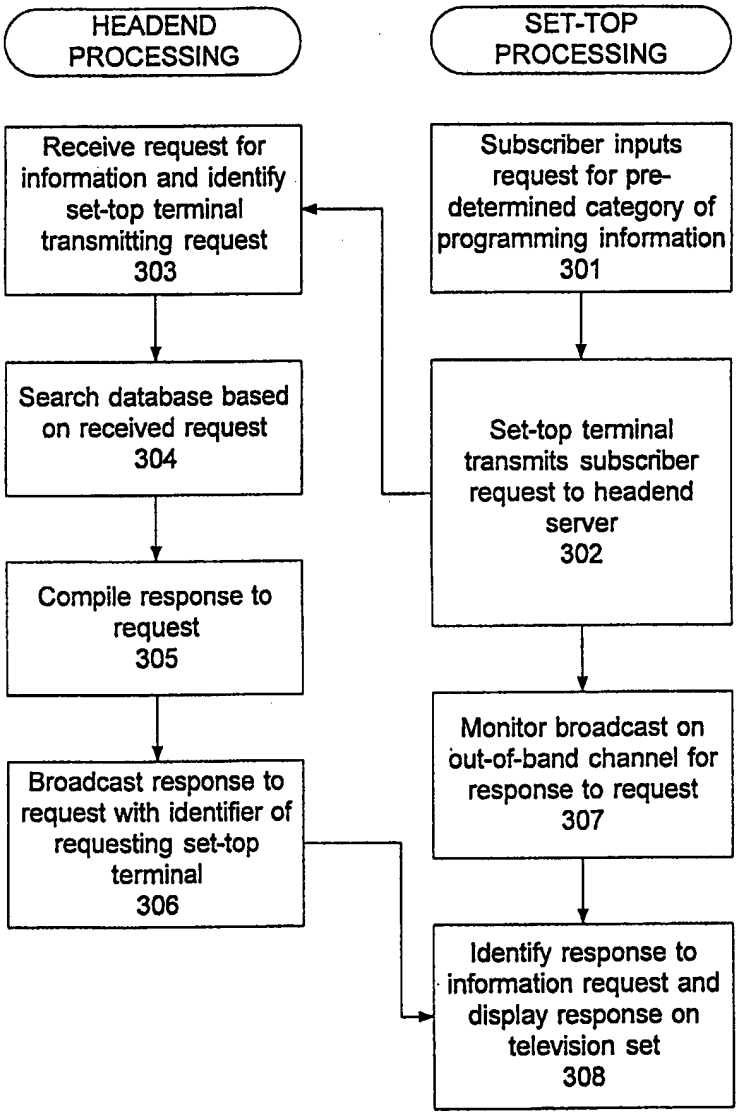

HEADEND PROCESSING
SET-TOP PROCESSING
Receive request for information and identify set-top terminal transmitting request 303
Subscriber inputs request for pre-determined category of programming information 301
Search database based on received request 304
Set-top terminal transmits subscriber request to headend server 302
Compile response to request 305
Monitor broadcast on out-of-band channel for response to request 307
Broadcast response to request with identifier of requesting set-top terminal 306
Identify response to information request and display response on television set 308

Fig. 3

INTERNATIONAL SEARCH REPORT

In ational Application No
PCT/US 99/09057

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/173 H04N7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 592 551 A (HAYASHI MICHAEL T ET AL) 7 January 1997 (1997-01-07) column 5, line 54 - line 65 column 6, line 37 - column 7, line 12 column 14, line 27 - line 37 ---	1,4-9, 14-17 11-13
X	WO 97 13368 A (BRIEN SEAN ANDREW O ;MILNES KENNETH ALAN (US); SCHEIN STEVEN MICHA) 10 April 1997 (1997-04-10) page 8, line 2 - line 8 page 21, line 5 - line 22 page 27, line 12 - line 19 --- -/--	1-4,9, 10,14

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 August 1999	12/08/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Sindic, G

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/09057

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 585 838 A (MATTHEWS III JOSEPH H ET AL) 17 December 1996 (1996-12-17)	1,2,4,5, 8,9,14, 15
A	column 5, line 12 - line 20 column 6, line 47 - line 52 column 12, line 22 - line 42 column 15, line 19 - line 32	3,6,7, 16,17
X	ROSENGREN J: "Electronic programme guides and service information" PHILIPS JOURNAL OF RESEARCH, vol. 50, no. 1, 1 January 1996 (1996-01-01), page 253-265 XP004008215 ISSN: 0165-5817 page 261; figure 1 page 263, paragraph 4 - paragraph 8	1,9

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

ir ational Application No
PCT/US 99/09057

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5592551 A	07-01-1997	US 5367571 A	22-11-1994
		US 5357276 A	18-10-1994
		AU 684936 B	08-01-1998
		AU 2281495 A	10-11-1995
		BR 9507404 A	07-10-1997
		CA 2187880 A	26-10-1995
		EP 0756797 A	05-02-1997
		FI 964191 A	18-12-1996
		JP 10502501 T	03-03-1998
		NO 964388 A	18-12-1996
		WO 9528799 A	26-10-1995
		US 5537292 A	16-07-1996
WO 9713368 A	10-04-1997	AU 7387196 A	28-04-1997
		CA 2232003 A	10-04-1997
		CN 1200221 A	25-11-1998
		EP 0880856 A	02-12-1998
		JP 10512420 T	24-11-1998
US 5585838 A	17-12-1996	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)